DESCRIPTION OF MAP UNITS

Qac ALLUVIAL AND COLLUVIAL DEPOSITS—sand and gravel along streams, alluvial fan gravels, and local accumulations of slope wash. Pleistocene age of some deposits based on geomorphic relationships.

Qe EOLIAN DEPOSITS—dune deposits of fine sand, silt, and clay. Pleistocene age of some dunes indicated by soil profiles and geomorphic relationships.

Ql LANDSLIDE DEPOSITS—heterogeneous deposits formed largely by repeated complex slump, mudflow, earthflow, and rockfall movements. Materials from local and adjacent sources mixed in varying degrees. Mostly underlain by Mancos Shale. Surficial expression hummocky and boulder strewn; usually expressed on aerial photographs by characteristic vegetational patterns.

Qls Active landslide deposits—slump and earthflow composed mostly of Mancos Shale. Disturbed roads and fence lines indicate landslides are active. Many small slides near ditches and springs not mapped.

Qlm Earthflow and mudflow lobes—only most prominent shown. Boundaries and extent based mostly on photogeologic, vegetational, and topographic expression.

Qvf VALLEY-FILL DEPOSITS OF BOSTWICK-SHINN PARK (0–250 ft)—alluvium and colluvium deposited in a valley cut in early Pleistocene time. Locally as much as 120 feet of coarse stream gravel at base; rocks are mostly porphyritic volcanic types. Stream gravel locally overlain by about 200 feet of colluvium derived in part from adjacent sources; includes rock types from most adjacent outcrops. Soil profiles exposed in an outcrop north of Ellison Gulch suggest deposition continued until late Pleistocene.

va Volcanic ash—rhyolitic, forms scattered lenses 2 to 6 feet long and as much as 8 inches thick about 70 feet below top of valley-fill deposits.

vb Volcanic ash (0–2 ft)—rhyolitic, about 140 feet below va. Continuity of discontinuous exposures not definitely established. Mineralogically similar to Pearlette Ash Member (late Kansan) of Sappa Formation in Nebraska.

PEDIMENT DEPOSITS:

Qpa Pediment remnant (0–50 ft)—poorly sorted and rounded alluvium and colluvium. Rock types similar to Qpb. Upper few feet strongly cemented by caliche.

Qpb Highest pediment remnant (0–50 ft)—poorly sorted and rounded alluvium and colluvium, about 180 feet above Qpa. Rocks include sedimentary and igneous types from Cretaceous and Tertiary formations in adjacent area to east. Upper few feet strongly cemented by caliche. Queried outcrops at south end of Shinn Park are surfaces cut on valley-fill deposits of Bostwick-Shinn Park.

Qsg OLDER STREAM GRAVEL (20–30 ft)—well-rounded coarse alluvium, boulders as large as 4 feet. Rock types are mostly volcanic porphyries. Caps hills above valley-fill deposits of Bostwick-Shinn Park.

QTg GRAVEL ALONG POOL GULCH (0–100 ft)—well-rounded alluvial stream gravel. Rock types are mostly cobbles of volcanic porphyries. In part similar to rock types in Tc. Some angular volcanic boulders. Deposit poorly exposed.

QTl OLDER LANDSLIDE DEPOSITS ON WATERDOG PEAK (100± ft)—unstratified heterogeneous mixture of materials derived from Upper Cretaceous and Tertiary formations present in adjacent area to south.

Tc CONGLOMERATE ON POVERTY MESA[1] (75± ft)—weakly cemented coarse conglomerate comprised of various sedimentary, granitic, porphyritic, volcanic, and metamorphic rock types derived from Precambrian and younger sources. Locally underlain by green to gray tuff breccia. Deposit poorly exposed.

Kf FRUITLAND FORMATION[2]—white to dusky-yellow sandstone interbedded with coal, brown carbonaceous shale, and green to black shale. Base of formation placed at lowest coal bed. Mostly slope forming, poorly exposed. Only lower part of formation preserved in quadrangle; thickness probably less than 50 feet. Thickness of exposed coal-bearing equivalent of formation in adjacent area to south about 200 feet.

c Coal bed—approximately 3 feet thick; subbituminous, bony.

Kpc PICTURED CLIFFS SANDSTONE[2] (200–250 ft)—upper part white to dusky-yellow fine-grained calcareous sandstone; lower part pale-olive to dusky-yellow interbedded calcareous shale and siltstone. Basal contact placed where shale becomes predominant. Cliff- and slope-forming.

Km MANCOS SHALE—dark-gray to black shale, in part sandy, silty, and calcareous. Finely crystalline dark-gray limestone concretions common. Thin bentonite beds scattered throughout. Formation mostly covered, lower part not exposed. Exposed thickness not accurately determinable because of extensive landslide cover; may be as much as 3,000 feet. Total thickness of formation may be as much as 5,000 feet. Oldest exposed fossil zone collected, *Scaphites depressus* (USGS Mes. loc. D3844); youngest zone collected, *Exiteloceras jenneyi* (USGS Mes. locs. D3178, D4810). Zone of *Didymoceras cheyennense* collected at top of formation in adjacent area to south (USGS Mes. loc. D3861).[3]

Kms Silty-marker bed (150± ft)—pale-olive to dusky-yellow siltstone to argillaceous siltstone. A ledge-forming marker bed about 600 to 700 feet below top of formation. Probably in zone of *Didymoceras nebrascense* (USGS Mes. loc. D3177).[3]

b Bentonitic-marker bed (50± ft)—dark-brown to black bentonitic and gypsiferous zone forming prominent marker bed about in middle of formation.

Kd DAKOTA SANDSTONE—lenticular white to yellow conglomeratic sandstone and interbedded sandstone and gray to black shale. Shale locally bleached white. Cliff- and ledge-forming. Incomplete lower part of section exposed; contains local white conglomeratic lenses at base that may be equivalent to Burro Canyon Formation of adjoining region. Thickness about 90 feet; total thickness in adjacent area as much as 200 feet.

Jm MORRISON FORMATION—upper part, variegated red, green, purple, and gray shales with sandstone and conglomeratic sandstone lenses. Lower part, interbedded lenticular sandstone, siltstone, and mudstone; mostly shades of red and green. Slope-forming, poorly exposed. Incompletely exposed in several fault blocks; thickness may be as much as 400 feet. Total thickness in adjacent area about 600 feet.[4]

Jw WANAKAH FORMATION—upper part, interbedded sandstone, siltstone, gypsum, and mudstone. Lower part, fine-grained sandstone overlying basal finely crystalline olive-gray limestone (2–3 ft). Limestone, in part intraclastic, may be equivalent to Pony Express Limestone Member. Slope-forming, poorly exposed. Exposed thickness may be as much as 50 feet. Total thickness in adjacent area about 150 feet.[4]

Je ENTRADA SANDSTONE (0–50± ft)—yellow fine-grained sandstone with some scattered medium to coarse well-rounded grains. Basal part conglomeratic; contains detritus from underlying Precambrian rocks. Formation seems to pinch out to the east within quadrangle. Poorly exposed. Thickness in adjacent area about 85 feet.[4]

pCg GABBRO—olive-black coarse-grained olivine gabbro; predominant minerals plagioclase, olivine, and pyroxene.

pCp PEGMATITE—white to pink chiefly concordant lenticular or sill-like bodies comprised of very coarse grained mixtures of quartz, feldspar, and mica. Some discordant lenticular and irregularly shaped masses.

pCs SCHIST AND GNEISS UNDIVIDED—pale yellowish-brown to olive-black; includes some irregular bodies of amphibolite. Predominant minerals quartz, plagioclase, microcline, biotite, muscovite, and amphibole.

[1]All of conglomerate on Poverty Mesa and most of landslide deposits mapped as glacial till by Atwood and Mather, 1932, Physiography and Quaternary geology of the San Juan Mountains, Colorado: U.S. Geol. Survey Prof. Paper 166. Detailed studies indicate an origin other than glacial for these deposits.

[2]These rocks included with the Mesaverde Group by Burbank and others, 1935, Geologic Map of Colorado: U.S. Geol. Survey. Fossil collections, as shown in table 1, indicate the Mancos Shale of the Cerro Summit area is equivalent to Mancos Shale, Mesaverde Group, and Lewis Shale of type area.

[3]Fossil identifications by W. A. Cobban (written commun., 1961, 1962, 1963).

[4]Craig, L., Holmes, C. N., Freeman, V. L., Mullens, T. E., and others, 1959, Measured sections of the Morrison Formation and adjacent beds in the Colorado Plateau Region, Colorado, New Mexico, and Utah: U.S. Geol. Survey open-file report.

EXPLANATION

Recent / Pleistocene — QUATERNARY

- Alluvial and colluvial deposits
- Eolian deposits
- Landslide deposits — Qls, *active landslide deposits*; Qlm, *prominent earthflow and mudflow lobes*
- Valley-fill deposits of Bostwick-Shinn Park — *Query indicates correlation questionable*; va, *volcanic ash*; vb, *volcanic ash*
- Pediment deposits — Qpa, *pediment remnant*; Qpb, *highest pediment remnant, about 180 feet above Qpa. Query indicates correlation questionable*

UNCONFORMITY

Pleistocene — QUATERNARY

- Older stream gravel of Shinn Park

Pliocene or Pleistocene — TERTIARY OR QUATERNARY

- QTg — Gravel along Pool Gulch
- Older landslide deposit on Waterdog Peak

UNCONFORMITY

Upper Eocene — TERTIARY

- Tc — Conglomerate on Poverty Mesa

UNCONFORMITY

Upper Cretaceous — CRETACEOUS

- Kf — Fruitland Formation; *c, coal bed at base of formation*
- Kpc — Pictured Cliffs Sandstone
- Km — Mancos Shale; Kms, *silty-marker bed*; b, *bentonitic-marker bed, dotted where concealed*

Lower and Upper Cretaceous — CRETACEOUS

- Kd — Dakota Sandstone; *Burro Canyon Formation may be mapped with Dakota Sandstone*

UNCONFORMITY

Upper Jurassic — JURASSIC

San Rafael Group

- Jm — Morrison Formation
- Jw — Wanakah Formation
- Je — Entrada Sandstone

UNCONFORMITY

PRECAMBRIAN

- pCg — Gabbro
- pCp — Pegmatite
- pCs — Schist and gneiss undivided

Contact — *Approximately located*

Concealed contact — *Shown locally for zones in Mancos Shale. Query at end of contact indicates limit to which contact can be extrapolated*

Fault — *Dashed where approximately located, short dashed where inferred, dotted where concealed. U, upthrown side; D, downthrown side*

Probable fault — *Dotted where concealed*

Hypothetical concealed detachment fault — *Placement between disturbed and undisturbed beds arbitrary*

Overturned anticline — *Showing approximate crestline, direction of dip of limbs, and plunge of axis*

Syncline — *Showing approximate troughline, dotted where concealed*

Overturned syncline — *Showing approximate troughline, direction of dip of limbs, and plunge of axis*

Minor syncline, showing plunge

75 — Strike and dip of beds

60 — Strike and dip of foliation

55 — Strike and dip of cleavage

Linear trends in Precambrian rocks taken from aerial photographs

Coal outcrop

Clinkered rock

Coal prospect

Gravel pit

D3864 — USGS Mesozoic fossil locality — *Some fossils collected in landslide deposits derived from Mancos Shale*

Landslide scarp — *Approximate base of landslide scarp. Only prominent scarps shown*

D103 — Fossil locality

Upper Cretaceous stages	Reference sequence Durango, Colo. area	Upper Cretaceous faunal zones (W. A. Cobban, written communication, 1964)	USGS Mes. fossil locs. (x denotes zone collected in adjacent area)
Maestrichtian	Upper part of Animas Formation	*Triceratops*	
	McDermott Member of Animas Formation	*Discoscaphites nebrascensis*	
		Discoscaphites nicolletii	
		Sphenodiscus cf. *lenticularis*	
	Kirtland Shale	*Baculites clinolobatus*	
	Fruitland Formation	*Baculites grandis*	
		Baculites baculus	
?	Pictured Cliffs Sandstone	*Baculites elisi*	
		Baculites jenseni	
		Baculites reesidei	
		Baculites cuneatus	
Campanian	Lewis Shale	*Baculites compressus*	
		Didymoceras cheyennense	x
		Exiteloceras jenneyi	D3178, D4310
		Didymoceras stevensoni	D3856?
		Didymoceras nebrascense	D3177?, D3859
		Baculites scotti	x
		Baculites gregoryensis	D3851, D3852, D3853, D3862, D3863, D3864, D3865, D3867, D3869, D3873
		Baculites perplexus	
		Baculites smooth species	
		Baculites asperiformis	D3846, D3847, D3849, D4309
	Mesaverde Group (type area)	*Baculites mclearni*	
		Baculites obtusus	
		Scaphites hippocrepis	
Santonian	Mancos Shale	*Desmoscaphites bassleri*	
		Desmoscaphites erdmanni	
		Clioscaphites choteauensis	
		Clioscaphites vermiformis	
Coniacian		*Scaphites depressus*	D3844?
		Scaphites ventricosus	
		Inoceramus deformis	
?		*Scaphites corvensis*	
Turonian		*Scaphites nigricollensis*	
		Scaphites whitfieldi	
		Scaphites warreni	x
		Prionocyclus hyatti	
		Selwynoceras woolgari	
		Inoceramus labiatus	
		Sciponoceras gracile	
Cenomanian		*Dunveganoceras albertense*	
		Dunveganoceras conditum	
		Dunveganoceras pondi	
		Plesiacanthoceras wyomingense	
		Plesiacanthoceras amphibolum	
	Dakota Sandstone	*Calycoceras* sp.	

Mancos Shale of Cerro Summit quadrangle

TABLE 1. FAUNAL ZONES REPRESENTED BY USGS MESOZOIC FOSSIL LOCALITIES IN THE CERRO SUMMIT QUADRANGLE
FAUNAL ZONES NOT DETERMINED FOR ALL LOCALITIES ON THE MAP

GEOLOGIC MAP OF THE CERRO SUMMIT QUADRANGLE, MONTROSE COUNTY, COLORADO

By
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1965